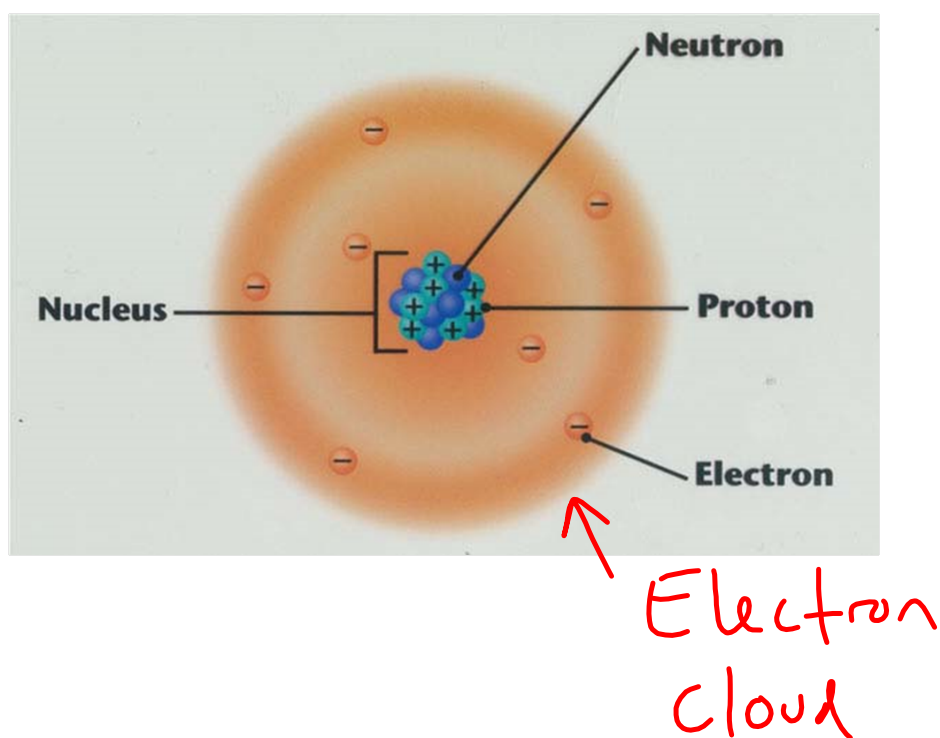
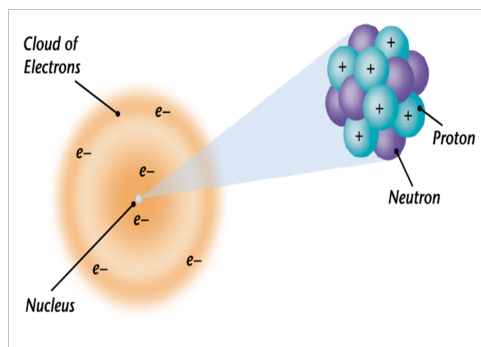


## The Atom

- The smallest part of an element that retains the element's properties
- Basic building blocks of matter
- 3 parts to an atom:
  - Proton
  - Neutron
  - Electron

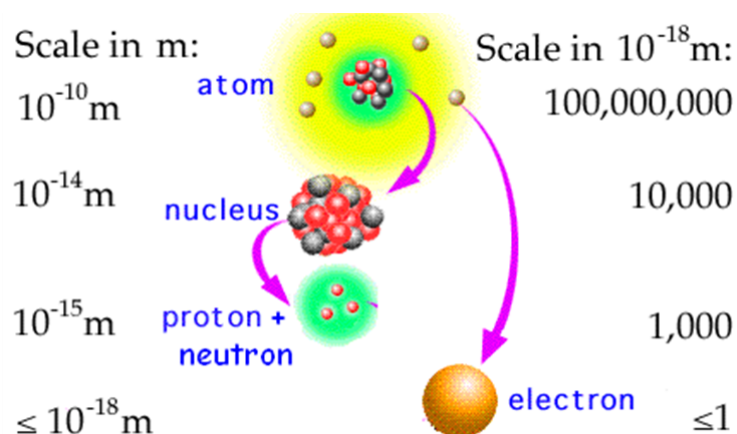




- Nucleus
  - Positively charged
  - Protons and Neutrons
    - Protons  $\rightarrow$  positively charged
    - Neutrons  $\rightarrow$  no charge
  - Quarks make up both protons and neutrons
- Electrons
  - Negatively charged
  - Occupy the electron cloud, which surrounds the nucleus
    - Arranged into "shells" or "orbitals"
  - Electrons do NOT move in perfect orbitals  $\rightarrow$  movement is actually unpredictable
  - Cloud gives approximate location of electrons

	Location	Charge	Mass	Special Fact
Protons	Nucleus	Positive (+) <i>each proton = +1</i>	1 amu Same as neutron	Number of protons determines the identity of the element
Neutrons	Nucleus	Neutral	1 amu Same as proton	
Electrons	Electron Cloud	Negative (-) <i>each electron = -1</i>	0.00054 amu (1/2000th mass of a proton or neutron)	Electron cloud takes up 99.999999% of the volume of the atom

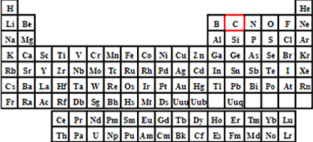
*amu = atomic mass unit*  
*charge = protons + electrons*



# Properties of Atoms:

- Atomic Number → 6  
# Protons

Group: 14/IVA/IVB	
12.011	
Electron Configuration:	Oxidation States:
1s <sup>2</sup>	+2
2s <sup>2</sup> 2p <sup>2</sup>	+4
	-4
C	
Carbon	



molybdenum	← element name
42	← atomic number number of protons
Mo	← atomic symbol
95.94	← atomic mass (this is an average mass)

Atomic Number		
All atoms of a given element have the same number of protons		
Nitrogen	Hydrogen	Potassium
7	1	19

- Each element has its own specific atomic number
- It is really difficult to change atomic numbers (atomic #)
- In a NEUTRAL atom, this is also the number of electrons

Mass # →	35	37
Atomic # →	17	17
	75.77%	24.23%
	Stable	Stable

### • Mass Number

- Mass of a specific ISOTOPE of an atom same element, different number of neutrons

- Sum of protons and neutrons

$$\# \text{ neutrons in } {}^{35}_{17}\text{Cl}$$

$$= 35 - 17 = 18$$

$$\# \text{ neutrons in } {}^{37}_{17}\text{Cl}$$

$$= 37 - 17 = 20$$

### • (Average) Atomic Mass:

$$\text{average mass} = (35)(.7577) + (37)(.2423)$$

$$= 26.5195 + 8.9651$$

$$= 35.485$$

35.485  
# on the periodic table